Space Weather Technical Forecast

Issued on Friday, 05 April 2024 at 01:27 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: No significant Space Weather activity expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Very Low with no significant flare activity observed. There are four sunspot regions on the visible disc, all of which are magnetically simple and inactive. No Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: Solar wind speeds, measured by ACE at the L1 position generally increased through the period due to the onset of one, or both coronal holes 16 and 17. Background solar winds increased to become slightly elevated or elevated, with a peak of 552km/s observed at 04/1849 UTC. Density was largely below average, but varied between average and above average levels until 04/0900 UTC. Total magnetic field strength (Bt) increased to moderate levels from around 04/0300UTC due to the coronal hole high speed stream connection, reaching a peak of 11nT at 04/0736 UTC, before decreasing to weak levels again later in the period. The north-south component Bz was mainly weakly positive (northwards) to start, but became predominantly weakly negative (southwards) from 04/0920 UTC, varying between +8/-7nT. Phi angle started mainly positive (away from the Sun) but became negative (towards the Sun) from 04/0530UTC. Geomagnetic activity was Quiet to Unsettled.

Energetic Particles / Solar Radiation: High energy proton flux (greater than 10MeV) observed at GOES-18 was at background levels. High energy electron flux (greater than 2MeV) observed at GOES-16 was at background levels. The associated 24-hour fluence remained well below the Active (1e8 integrated flux) threshold, with a value of 2.56e6 integrated pfu at 05/0000UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Very Low activity is expected, with a slight chance of isolated M-flares.

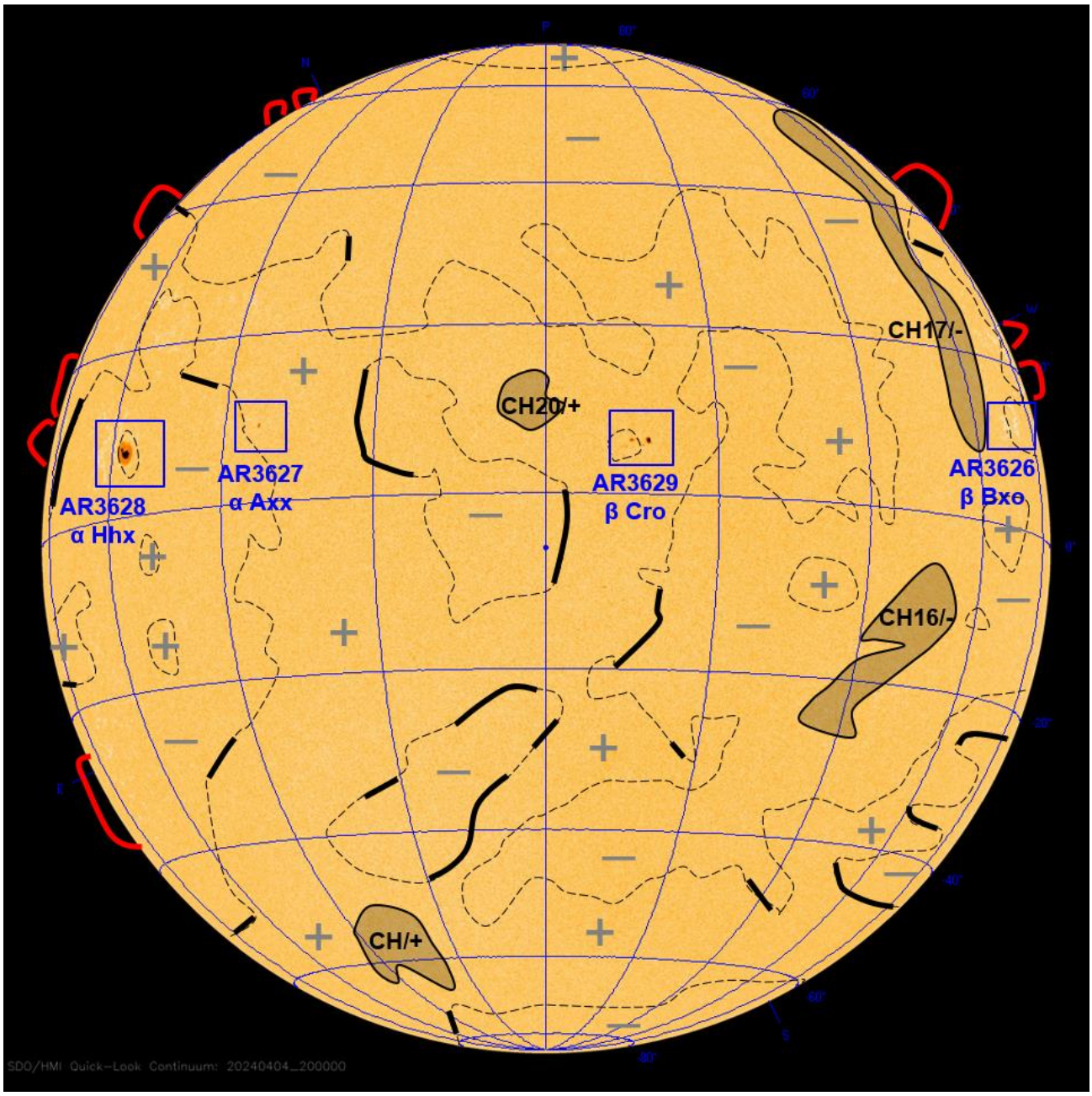
Solar Wind / Geomagnetic Activity: No Earth-directed CMEs are forecast. Solar wind speeds are at slightly elevated levels due to ongoing coronal hole enhancements. Speeds are forecast to decrease in the coming days, returning to background levels with no further significant enhancements expected during the period. Geomagnetic activity is forecast to be Quiet to Unsettled on Day 1 (05 Apr), with the chance of isolated Active intervals at first. Mainly Quiet activity is expected through Days 2-4 (06-08 Apr).

Energetic Particles / Solar Radiation: High energy proton flux as observed by GOES-18, is expected to remain at background levels. High energy electron flux is forecast to persist at mainly background levels initially, likely rising to Moderate or High levels at diurnal peak by days 3 and 4 (07 and 08 Apr). Electron fluence is expected to remain below the Active (1e8 integrated pfu) threshold throughout.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Figure 1. Solar Analysis Valid 04/2000 UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Met Office Space Weather Technical Forecast

Geomagnetic Storms:

No Earth directed CMEs are forecast.

Solar winds speeds are slightly elevated between 400-480km/s due to high speed stream influence from a combination of negative coronal holes 16 and 17. Speeds are expected to decline through Days 1 and 2 (05 and 06 Apr), returning to background levels, with no further significant coronal hole enhancements expected through the period.

Geomagnetic activity is forecast to be Quiet to Unsettled on Day 1 (05 Apr), with the chance of isolated Active intervals at first. Mainly Quiet activity is expected through Days 2-4 (06-08 Apr).

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections - Nil

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Radio Blackouts - X-Ray Flares:

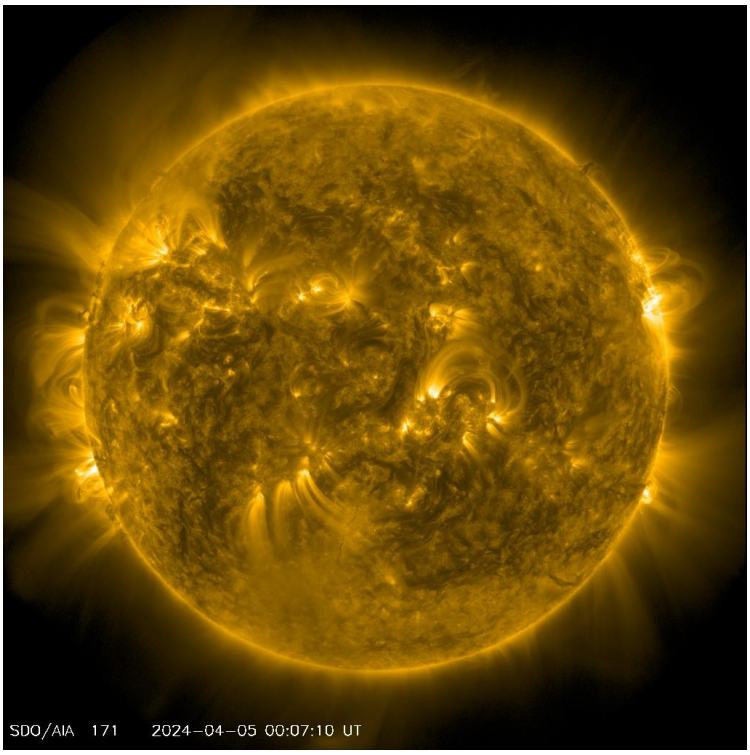
There are four sunspot regions on the visible disc. AR3628 in the northeast is by far the largest of these, but this, like the other regions is magnetically simple and inactive. AR3629 located in the northwest disc has undergone some recent growth, with the emergence of several small spots.

Magnetic looping evident in SDO/AIA imagery close to the eastern limb suggests there is the potential for multiple regions to rotate across from the farside during the period. These likely contain a number of Ex-regions that may still persist as sunspot groups. Nominally the M-flare risk is increased from 06 Apr (Day 2) onwards.

Low to Very Low Solar activity is expected, with a slight chance of isolated M-flares.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	5	10	10	10
Very Active	R3 to R5 X Class	No	1	1	1	1

Figure 2: SDO AIA-171 imagery at 05/0007 UTC. Magnetic looping indicated near or just over eastern limb suggestive of potential new or returning regions onto the visible disc in the coming days.



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Solar Radiation Storms - (High Energy Protons):

High energy proton flux observed by GOES-18 is at background levels and expected to remain so, with none of the visible active regions currently expected to bring a risk of significant proton rich flares.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	1	1	1	1
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

High Energy Electrons Event (≥ 2MeV):

High energy electron flux is expected to increase from mainly background levels in the coming days following the easing of the high-speed streams from coronal holes 16 and 17. Diurnal peaks of Moderate to High flux are likely, especially on days 3 and 4 (07 and 08 Apr).

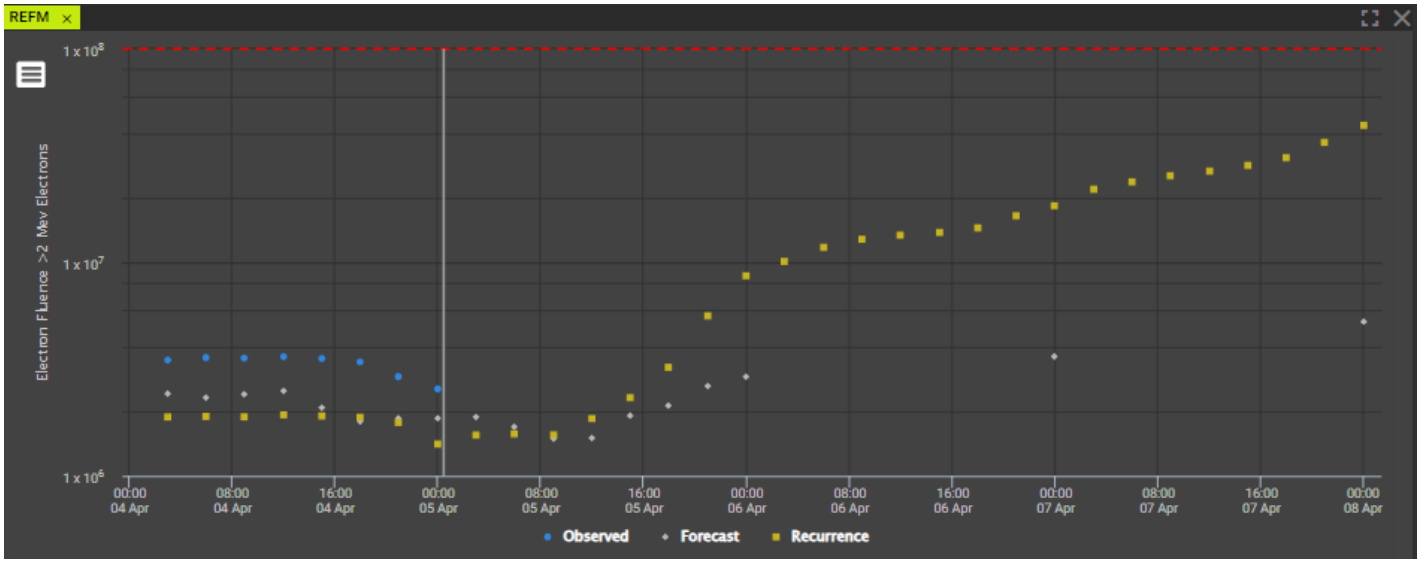
24 hour electron fluence is expected to remain well below the Active (1e8 integrated pfu) threshold on days 1 and 2 (05 and 06 Apr). A rising trend is likely to be observed, particularly into days 3 and 4 (07 and 08 Apr) but not expected to exceed the Active threshold.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	No	1	1	1	5
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	1	1	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Figure 3: Latest MOSWOC REFM model output. Forecast indicating a rising trend through the period, but well below Active (1e8 integrated flux) threshold. Recurrence expected to run too high.



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.